

Equity in Canadian health care: Does socioeconomic status affect waiting times for elective surgery?

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Abstract

Background: Waiting times for surgical and other procedures are an important measure of how well the health care system responds to patient needs. In a universal health care system such as Canada's, it is important to determine if waiting times vary by socioeconomic status (SES). We compared waiting times for elective surgery of patients living in low and high socioeconomic areas.

Methods: We reviewed the medical charts of all patients who underwent elective surgery at a Canadian academic health centre between 1992 and 1999. Using patient postal codes we assigned SES on the basis of 5 characteristics in the 1996 census data. We compared waiting times for surgery for people from regions in the lowest third (low SES group) with that for patients from regions in the upper third (high SES group).

Results: On average, patients in the high SES group waited 31.1 days and those in the low SES group waited 29.3 days. When differences in waiting times for 22 common procedures were examined between the groups, only the difference for prostatectomy was statistically significant: patients in the high SES group waited 4.4 fewer days than those in the low SES group.

Interpretation: We found little evidence that residing in a region in which SES was in the lowest third was associated with longer waiting times for elective surgery.

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Early studies of Canadian medicare suggested that premedicare disparities of access had been reduced,¹⁻⁴ and subsequent survey-based studies confirmed that medical need and demographic characteristics, rather than income, determined use.⁵⁻⁷

Consistent with the known burden of illness, people of lower socioeconomic status (SES) appear to use some health services more than those with higher SES. Among Ontario women, although need has been shown to be the principal determinant of hospital admission, lower income has been associated with higher use.⁸ For both sexes, the correlation between low income and high hospital use has been shown to persist throughout the recent period of hospital restructuring in Ontario.⁹ It has also been demonstrated that, although medical need was the main explanation for the use of Ontario mental health services, economic disadvantage was also a determinant.¹⁰ Broadly similar results have also been identified for Nova Scotia¹¹ and Manitoba.¹² Studies in

Winnipeg¹³ and Ontario¹⁴ and a national survey¹⁵ all found that, although SES posed no barrier to visits to primary care physicians, higher SES was associated with more visits to specialists. In contrast, a recent Ontario study¹⁶ reported that visits to specialists were explained by health status rather than by self-reported household income.

The existing literature is predominantly concerned with receipt of service, rather than the process of accessing care; however, it is possible that people of low SES may wait longer than more affluent people to receive service. Alter and colleagues¹⁷ reported that waiting times for coronary angiography were inversely correlated with neighbourhood income quintiles. An Ontario study¹⁸ determined that women from lower income neighbourhoods were less likely than women from higher income areas to receive radiation therapy within a year of diagnosis. In contrast, a Winnipeg study¹⁹ concluded that there was no discernable pattern of waiting for several types of surgery by neighbourhood income level from 1997 to 1999.

In this study we used a chart audit to document waiting times and receipt of service rather than self-reported survey data, which may be subject to recall error.²⁰⁻²³ We focused on elective procedures because care for which timing is discretionary will be most likely to show variation. The waiting period studied was the time from surgical consultation to procedure.

Methods

The 2 hospitals in the academic health centre in Kingston, Ont., provided elective surgery during the 7-year study period. The vast majority of surgical patients are drawn from 2 counties in which socioeconomic characteristics differ in minor respects from provincial norms: there are more unemployed males aged 15-24 years; there is a higher proportion of single mothers; and, although there is a smaller proportion of low-income households in the catchment area, both average and median incomes are lower than the provincial mean.

All elective inpatient and same-day surgeries done at the centre between July 1, 1992, and June 30, 1999, were identified from operating room records. The following information was collected from charts: the procedure type and date, the date the patient was added to the waiting list (taken from the consultant's letter to the referring physician) and the patient's postal code.

Catchment area: Between 1993 and 1996, the 2 hospitals provided 94% of hospital-based care received by residents of the city

of Kingston and Frontenac County, and they provided 64% received by residents of the adjacent Lennox & Addington County. No other county in the region received more than 50% of its hospital care from Kingston, but local data and data from the Canadian Institute for Health Information indicate that the centre serves patients from across southeastern Ontario (Kingston General Hospital Strategic Information Development Unit: unpublished data [market share report, 1993–1996]).

Assigning SES: Because the SES of individuals was unknown, SES was assigned to patients on the basis of location of residence. Data were drawn from the 1996 census²⁴ for the 2755 enumeration areas in the southeastern Ontario catchment area and correlated with the postal codes of 4678 patients using a postal code conversion file.²⁵ Enumeration areas with a high proportion of rental accommodations, a high proportion of single-parent families, low household incomes, high unemployment rates among people over 15 years of age and low levels of postsecondary education were identified as being of low SES. Such grouped indicators have been used in other Canadian studies;^{12,13,26} this method minimizes the limitations that arise when a single measure such as income is used.^{27,28}

In the event that a postal code crossed the boundary of an enumeration area, the “single-link indicator,” as assigned to the postal code in the postal code conversion file, was used to allocate the postal code to a specific enumeration area. On the rare occasion when the single-link indicator could not resolve the issue (in 100 cases), the postal code was examined and individually allocated an SES, on the basis of the attributes of the immediately surrounding enumeration areas.

In as much as census data are less accurate than individual data for assigning SES to individuals,^{29,30} devising small, precisely defined categories may be misleading. Instead, we chose to create a clear demarcation of 2 broad populations at the extremes of an SES continuum. Enumeration areas were considered to be below average (low SES) if they were at least 1 standard deviation below the catchment area average on 3 of the 5 indicators. Areas having a low prevalence of low-status indicators were considered to be above average (high SES). The low SES group consisted of 913 enumeration areas with a population of 519 746; the high SES group consisted of 930 enumeration areas with a population of 646 170. They were separated by an average group of roughly the same number and distribution.

Calculating waiting times: Waiting time data display a positively skewed distribution, and thus a direct calculation of the mean as a measure of central tendency is uninformative and analyses of variance (ANOVAs) cannot be used to analyze such data. Therefore, the original distribution data were first normalized, using their natural logs ($\ln[x+1]$). Because the natural log of zero (i.e., same-day surgery) is a mathematical impossibility, data were shifted up by 1 day to include those patients. Mean waiting times were estimated by calculating the mean of the transformed data ($\sum \ln[x+1]/n$), turning this value back into a real number by calculating the exponent of the mean of the natural logs ($\exp\{\sum \ln[x+1]/n\}-1$), and then shifting down 1 to negate the earlier shift up. The resulting values were considered to represent the mean of the original data set. Natural logs of the waiting times were used in each ANOVA and the results were transformed into real numbers. Statistically significant differences in means were thus identified among regions of different SES.

Ethics review was conducted by the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board.

Results

Of the 53 378 surgeries performed during the study period, postal codes could be identified for 39 965. Patients whose postal codes were not recorded were more likely to have had surgery at one of the hospitals but were otherwise similar (waiting time, sex, date of procedure, surgical department) to those whose postal codes were known. Of those with postal codes identified, 875 were excluded because they came from outside the catchment area. Of the 39 090 that could be linked to SES data, 12 959 were in the high SES group, 11 048 were in the low SES group, and the balance were in the average SES group.

For all surgical procedures, the average time from being placed on the waiting list to surgery was 30.6 days. On average, the high SES group waited 31.1 days and the low SES group waited 29.3 days, a statistically significant difference of 6% ($p < 0.001$). When the data were analyzed by surgical department or division, only 2 statistically significant differences were found: for thoracic surgery, the high SES group waited 10.4 days and the low SES group waited 8.6 days ($p = 0.032$); for gynecological procedures, the waiting times were 19.6 and 15.8 days respectively ($p < 0.001$).

Waiting times for 22 common elective procedures were examined. As shown in Table 1, there were only 2 procedures for which waiting time differed by SES. In the case of prostatectomy, patients in the high SES group waited 4.4 fewer days than those in the low SES group ($p = 0.026$). For tubal ligation, the high SES group waited 4.1 more days than the low SES group ($p = 0.037$). However, when the tubal ligations were examined more closely, the mean waiting time among patients undergoing this operation as a single procedure was 28.3 days, as compared with 11.0 days if it was an element of a multiple procedure. In neither of these cases was the difference in SES statistically significant.

Interpretation

We found no relation between socioeconomic status and waiting times for elective surgical procedures at an Ontario academic health centre. These results were stable over a 7-year period characterized by reduced health care spending and hospital restructuring. Our findings are consistent with the conclusions of a recent study of SES and use of physicians’ services in Ontario during a similar study period.¹⁶

It is important to acknowledge the limitations to our approach. First, we report some statistically significant differences in waiting times, but because they refer to elective procedures, they are not likely to be clinically significant. Second, although we use an ecological measure of SES rather than a direct assessment, we believe the literature supports this as a valid use of census data.^{25,31} Third, by focusing on *receipt* of service, our analysis excludes patients who did not follow through with surgery after being placed on the waiting list or who continued to wait beyond

Table 1: Mean waiting times for elective surgery by procedure and socioeconomic status (SES)

Procedure	No. of patients			Mean wait, d			High SES v. low SES			
	Total	High SES	Low SES	All patients	High SES	Low SES	Difference	% difference	p value	Longer wait?
Arthroscopy, knee	1148	599	463	50.9	55.7	56.1	0.3	0.6	0.93	No
Arthroplasty, knee	573	198	142	149.4	151.6	141.4	10.2	6.7	0.53	No
Arthroplasty, hip	547	153	130	108.5	114.3	92.6	21.6	18.9	0.16	No
Breast biopsy	902	327	249	13.5	13.2	13.2	0.0	0.2	0.97	No
Cataract removal	1148	1094	1097	48.8	50.6	54.5	4.0	7.3	0.12	No
Coronary artery bypass grafting	929	257	229	29.2	27.8	30.7	2.9	9.6	0.43	No
Cystoscopy	1148	490	467	14.1	15.0	15.8	0.9	5.4	0.45	No
Dental extractions	809	254	273	33.4	33.4	34.5	1.1	3.0	0.71	No
Dilation and curettage	746	272	201	17.8	18.0	16.5	1.5	8.4	0.38	No
Disc surgery (neurosurgery)	262	74	55	47.7	34.4	39.0	4.6	11.9	0.66	No
Disc surgery (orthopedic surgery)	162	60	46	28.2	27.0	33.5	6.5	19.4	0.37	No
Hernia, inguinal	1015	371	289	33.2	33.3	31.7	1.7	5.0	0.54	No
Hysterectomy	1026	379	237	30.4	32.1	32.2	0.1	0.2	0.98	No
Laparoscopic cholecystectomy	996	361	292	28.8	30.2	26.7	3.5	11.6	0.18	No
Laparoscopy (general surgery)	640	237	182	27.3	27.6	25.7	1.8	6.6	0.55	No
Laparoscopy (gynecology)	540	176	164	24.6	23.2	24.2	1.0	4.0	0.74	No
Mammoplasty	561	175	182	111.2	115.8	106.4	9.4	8.1	0.34	No
Mastectomy, simple	264	87	66	13.8	15.0	12.9	2.1	13.8	0.33	No
Mastectomy, radical	153	59	46	13.1	13.8	12.1	1.6	11.9	0.47	No
Myringotomy and tubes	915	314	272	24.6	22.5	23.5	1.0	4.3	0.57	No
Prostatectomy	654	222	173	16.9	16.2	20.6	4.4	21.3	0.026	Yes (low SES)
Septorhinoplasty	408	143	121	51.1	51.9	51.9	0.1	0.2	0.99	No
Tonsillectomy and adenoidectomy	1148	419	316	36.3	36.5	35.5	1.2	3.3	0.61	No
Tubal ligation										
As single procedure	802	282	254	28.3	29.4	25.7	3.7	12.5	0.14	No
As part of multiple procedures	278	92	87	11.0	13.4	10.2	3.3	24.2	0.15	No
All tubal ligations	1080	374	342	22.3	24.3	20.2	4.1	16.9	0.037	Yes (high SES)

the study period. We acknowledge that this approach introduces a bias into the calculation of waiting times that prospective data do not,³² but it should not influence the socioeconomic distribution of waiting times. Fourth, our data did not permit adjustment for severity of illness. It is possible that people of lower SES enter the health care system at a later stage in the disease process and should experience shorter waits than less severely ill people of higher SES. Finally, the interval between surgical consultation and receipt of surgery is only 1 element in the waiting experience that begins when a patient requests an appointment with his or her family physician. There is some evidence that patients from low SES areas may wait longer for diagnostic tests¹⁷ or initial contact with a surgeon,¹³ but subsequently the wait differentials disappear. Our data did not allow us to examine phases in the waiting experience.

Despite the fact that financial barriers do not overtly affect the receipt of health care in Canada, it is possible that SES influences access to service on a more subtle level. Two previous studies have found lower SES to be associated with longer waits for service in Ontario.^{17,18} However,

our findings document that, during a period of widespread restructuring in Ontario hospitals, people from low SES areas did not wait longer than those from high SES areas for elective surgery. It has been suggested that a valuable approach to monitoring the impact of the health reforms is to track trends in service delivery to society's most vulnerable groups. Our results suggest, as do those from Manitoba, that efficiency does not appear to have been purchased at the price of equity.³³

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